relative to the connector of the second structure. This cable is fastened to the movable piping before a final assembly of swivel joints or rotations, which results in the opening of the piping being spontaneously oriented downwards, due to gravity. The connection is complicated by this configuration, since the approach of the fastening flange in the presence of motion due to the waves is delicate.

FR 2 854 156 discloses an assembly for loading and unloading products, comprising a balanced loading and unloading arm installed at a first location and having a compass-style duct system mounted by one of its ends on a base and provided at the other of its ends with a connection system suitable for connecting the compassstyle duct system to a coupling means installed at the second location, this assembly comprising, in addition, a cable joined on the one hand to means integral with the base and suitable for subjecting this cable to a constant tension and suitable for being joined, on the other hand, to the second location, the assembly also comprising guiding means capable of co-operating with the cable so as to guide the connection system along a trajectory materialized by the said cable until the connection system is brought into a position of connection to the coupling means.

By contrast, patent application FR 2 941 434 describes a transfer system using, for the connection of the articulated tube that comes from the first ship to the piping of the second ship, an acquisition cable (also called LNGC cable or methane tanker cable) fastened to the free end of the tube and maneuvered by a winch disposed on the second ship. This solution enables the coupling of the ducts to be carried out by a movement of the free end of the articulated tube having a rising main component, the free end then being received by a connector on the second ship the opening of which is substantially downwardly directed. Such a solution enables shocks during the connection to be avoided simply, and to establish a coupling requiring no guidance other than that given by the acquisition cable.

Nevertheless, despite the solutions proposed until now, certain situations may still be difficult to manage during maneuvers. In particular, in a situation of emergency disconnection, it is desired to avoid plunging of the free end of the movable piping into the water. Furthermore, given the fast rates necessitated by the use of the structures, it is desired to enable the two ships to connect their ducting rapidly, and to move apart from each other as fast as possible after the disconnection, whatever the circumstances thereof.

The present invention thus relates to a system and a method enabling fluid transfer to be carried out even more simply, quickly and safely, by simplifying in particular the steps of connecting and disconnecting the piping of the two ships.

To that end there is provided an offshore fluid transfer system comprising a boom and at least one movable fluid conveying pipe attached to a point on the boom, said movable pipe comprising, starting from its anchorage point, a length for extension, then, at its free end, an outer valve for coupling to a third party loading pipe, a maneuvering cable called outer maneuvering cable maneuvered from the boom being furthermore linked to the free end of the movable pipe at a point referred to as anchorage point, ~~characterized in that~~ the anchorage point is rigidly connected (with no degree of freedom) to the outer valve, characterized in that a second maneuvring cable, referred to as inner maneuvering cable, links an intermediate point of the moveable pipe to the boom.

There is also provided a method for offshore fluid transfer by at least one movable fluid conveying pipe attached to a boom and comprising, starting from its anchorage point, a length for extension then an outer valve for coupling to a third party loading pipe, the general maneuver for coupling or for decoupling comprising a step of extending, or respectively of retracting, the movable pipe using an outer maneuvering cable maneuvered from the boom and linked to the movable pipe at a point referred to as anchorage point, ~~characterized in that~~ the anchorage point is rigidly connected (with no degree of freedom) to the outer valve, characterized in that the step of extending, or respectively of retracting is carried out with the use of a second maneuvering cable, referred to as inner maneuvering cable, linking an intermediate point of the moveable pipe to the boom.

Thanks to this method, it is possible to extend the movable conveying pipe prior to any connection with a third party floating unit, which may then approach even though the pipe is already extended, while having the advantage, once the third party floating unit is present, of a fast connection by means for coupling by a rising movement, such as those presented in FR 2 941 434.

Furthermore, it is possible, during disconnection, to have the advantage of a fast and simplified disconnection by the coupling means. This disconnection is then carried out by decoupling by descending movement. It is followed by an action of removing the links with the third party floating unit before retracting the movable conveying pipe.

~~According to a feature of implementation, the step of extending, or respectively of retracting, is carried out with the use of a second maneuvering cable, referred to as inner maneuvering cable, linking an intermediate point of the movable pipe to the boom. By virtue of this feature~~ Moreover, the tension in the outer maneuvering cable is reduced relative to the prior art.

According to an advantageous feature, the coupling or uncoupling is carried out by maneuvering the free end also using an acquisition cable linking said free end to a point on a third party floating unit.

According to a feature of implementation, the coupling or the uncoupling is carried out in at least two steps, the outer maneuvering cable being wound or unwound during at least one step and the acquisition cable being wound or unwound during at least the other step.

According to a feature of implementation, a safety cable links a point on the third party floating unit and a structure fastened to the free end of the movable pipe during the fluid transfer, said safety cable being configured to unwind at a speed lower than a maximum speed of safety in case of emergency disconnection. This

CLAIMS

1. An offshore fluid transfer system comprising a boom (2100) and at least one movable fluid conveying pipe (3000) attached to the boom, said movable pipe (3000) comprising, starting from its anchorage point, a length for extension, then an outer valve (3210) for coupling to a third party loading pipe, a maneuvering cable called outer maneuvering cable (4100) maneuvered from the boom (2100) being furthermore linked to the free end of the movable pipe at a point referred to as cable anchorage point, ~~characterized in that~~ the anchorage point is rigidly connected to the outer valve (3210), characterized in that a second maneuvering cable, referred to as inner manervering cable (4300) links an intermediate point of the movable pipe (3000) to the boom.

2. An offshore fluid transfer system according to claim 1, comprising, on the movable pipe (3000), on the approach to the free end, a set of swivel joints (3220) disposed such that the set of swivel joints (3220) is included between the length for extension and the anchorage point.

3. An offshore fluid transfer system according to one of the preceding claims, characterized in that it further comprises a safety device configured to maintain a constant unwound length of the outer maneuvering cable (4100) in case of emergency disconnection between the movable pipe (3000) and the third party loading pipe.

4. An offshore fluid transfer system according to one of the preceding claims, characterized in that the length for extension of the movable conveying pipe (3000) is constituted by at least two successive articulated arms (3100, 3200).

5. An offshore fluid transfer system according to one of the preceding claims, characterized in that the length for extension of the movable conveying pipe (3000) is constituted by at least one flexible pipe.

6. An offshore fluid transfer system according to one of the preceding claims, characterized in that it also comprises a centering cone (3220).

7. An offshore fluid transfer system according to one of the preceding claims, characterized in that the anchorage point is on a transverse holding structure (3020) joining together at least two movable fluid conveying pipes (3001, 3002, 3003) parallel to each other in the vicinity of their free end.

8. An offshore fluid transfer system according to one of the preceding claims, characterized in that the boom comprises a first rising segment (2150) followed by a second horizontal segment (2160).

9. An offshore fluid transfer system according to claim 8, characterized in that the horizontal segment is extended by a pointed segment (2170) culminating at a slightly greater height than that of the horizontal segment.

10. An offshore fluid transfer system according to claim 8 or 9, characterized in that the outer maneuvering cable extends to the movable pipe from a first position on the second horizontal segment and is wound around a first winch (2172), the inner maneuvering cable extends to the movable pipe from a second position on the second horizontal segment and is wound around a second winch (2161), and the first position is spaced horizontally from the second position in a direction toward the distal end of the second horizontal segment.

~~8~~ 11. A method for offshore fluid transfer by at least one movable fluid conveying pipe (3000) attached to a boom (2100), said movable pipe (3000) comprising, starting from the anchorage point, a length for extension followed by an outer valve (3210) for coupling to a third party loading pipe, the general maneuver for coupling or for decoupling comprising a step of extending, or respectively of retracting, the movable pipe (3000) using an outer maneuvering cable (4100) , maneuvered from the boom (2100) and linked to the free end of the movable pipe, ~~characterized in that~~ the anchorage point for the cable is rigidly connected to the outer valve (3210)~~.~~

~~9. A method for offshore fluid transfer according to the preceding claim~~, characterized in that the step of extending, or respectively of retracting, is carried out at least with the use of a second maneuvering cable, referred to as inner maneuvering cable (4300), linking an intermediate point of the movable pipe (3000) to the boom.

~~10~~ 12. A method for offshore fluid transfer according to ~~one of the preceding method claims~~ claim 11, characterized in that the coupling or uncoupling is carried out by maneuvering the free end also using at least one acquisition cable (4200) linking said free end of the movable pipe to a point on a third party floating unit bearing the third party loading pipe.

~~11~~ 13. A method for offshore fluid transfer according to one of the preceding method claims, characterized in that the coupling or the uncoupling is carried out in at least two steps, the outer maneuvering cable (4100) being wound or unwound during at

least one step and the acquisition cable (4200) being wound or unwound during at least the other step.

~~12~~ 14. A method for offshore fluid transfer according to one of the preceding method claims, characterized in that a safety cable (1210) links a point on a third party floating unit bearing the third party loading pipe and a structure fastened to the free end of the movable pipe during the fluid transfer, said safety cable (1210) being configured to unwind at a speed lower than a maximum speed of safety in case of emergency disconnection.

~~13~~ 15. A method for offshore fluid transfer according to claim ~~12~~ 14, characterized in that the structure fastened to the free end of the movable pipe during the transfer of the fluid is a lower valve of a valve-coupler (1120) of the third party

loading pipe, said valve-coupler (1120) comprising a lower valve (1121) and an upper valve (1122) separated by an emergency decoupling system (1128).

~~14~~ 16. A method for offshore fluid transfer according to one of the preceding method claims, characterized in that the coupling or the decoupling is carried out in at least two steps, centering cones (1110, 3220) entering into contact and into abutment during a first step, and a hydraulic coupler (1125) engaging a connection such that the fastening flanges are in contact and are centered, during a second step.

17. A method for offshore fluid transfer according to claim 12, characterized in that the step of extending comprises the following successive steps:

- putting into place the acquisition cable using a messenger cable;
- winding the outer cable and unwinding the inner cable while keeping the acquisition cable under a minimum constant tension;
- slackening the inner cable such that only a minimum constant tension is applied to it once a change of tension therein no longer has an effect on the position of the pipe, the outer cable being substantially vertical at that time;
- winding the acquisition cable;
- stopping the winding of the outer cable, then applying a minimum constant tension to it.

18. A method for offshore fluid transfer according to claim 12, characterized in that the retracting step comprises the following successive steps:

- unwinding the acquisition cable at constant speed, while keeping the outer and inner cables under minimum constant tension to avoid them going slack;
- providing a constant length of outer cable;
- unwinding the acquisition cable at constant speed while the inner cable is kept at a minimum constant tension;
- detaching the acquisition cable from the pipe when its slackening no longer has an impact on the movement or the position of the pipe;
- winding the inner cable and controlling the length of the outer cable so as to bring the pipe to a parking position.

19. A method for offshore fluid transfer according to claims 14 and 18, characterized in that, in a procedure for emergency disconnection, the outer cable is kept at a constant length, the inner cable is kept at a minimum constant tension so as to avoid it slackening, an emergency disconnection system is activated and the safety cable is unwound at the speed lower than the maximum safety value, until it detaches by itself from a drum of a winch on which it is wound, then the inner cable is wound at constant speed and the outer cable is unwound at constant speed so as to bring the pipe into the parking position.